

**Notice of Allowability**

Application No.

10/702,046

Examiner

Richard L. Leung

Applicant(s)

PAN ET AL.

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-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address--

All claims being allowable, PROSECUTION ON THE MERITS IS (OR REMAINS) CLOSED in this application. If not included herewith (or previously mailed), a Notice of Allowance (PTOL-85) or other appropriate communication will be mailed in due course. **THIS NOTICE OF ALLOWABILITY IS NOT A GRANT OF PATENT RIGHTS.** This application is subject to withdrawal from issue at the initiative of the Office or upon petition by the applicant. See 37 CFR 1.313 and MPEP 1308.

1. ☒ This communication is responsive to amendment filed 28 January 2005.
2. ☒ The allowed claim(s) is/are 1-17.
3. ☐ The drawings filed on \_\_\_\_\_ are accepted by the Examiner.
4. ☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
  - a) ☒ All    b) ☐ Some\*    c) ☐ None    of the:
    1. ☒ Certified copies of the priority documents have been received.
    2. ☐ Certified copies of the priority documents have been received in Application No. \_\_\_\_\_.
    3. ☐ Copies of the certified copies of the priority documents have been received in this national stage application from the International Bureau (PCT Rule 17.2(a)).

\* Certified copies not received: \_\_\_\_\_.

Applicant has THREE MONTHS FROM THE "MAILING DATE" of this communication to file a reply complying with the requirements noted below. Failure to timely comply will result in ABANDONMENT of this application.

**THIS THREE-MONTH PERIOD IS NOT EXTENDABLE.**

5. ☐ A SUBSTITUTE OATH OR DECLARATION must be submitted. Note the attached EXAMINER'S AMENDMENT or NOTICE OF INFORMAL PATENT APPLICATION (PTO-152) which gives reason(s) why the oath or declaration is deficient.
6. ☒ CORRECTED DRAWINGS ( as "replacement sheets") must be submitted.
  - (a) ☐ including changes required by the Notice of Draftsperson's Patent Drawing Review ( PTO-948) attached
    - 1) ☐ hereto or 2) ☐ to Paper No./Mail Date \_\_\_\_\_.
  - (b) ☒ including changes required by the attached Examiner's Amendment / Comment or in the Office action of Paper No./Mail Date \_\_\_\_\_.

Identifying indicia such as the application number (see 37 CFR 1.84(c)) should be written on the drawings in the front (not the back) of each sheet. Replacement sheet(s) should be labeled as such in the header according to 37 CFR 1.121(d).
7. ☐ DEPOSIT OF and/or INFORMATION about the deposit of BIOLOGICAL MATERIAL must be submitted. Note the attached Examiner's comment regarding REQUIREMENT FOR THE DEPOSIT OF BIOLOGICAL MATERIAL.

**Attachment(s)**

- |  |  |
|--|--|
| 1. <input checked="" type="checkbox"/> Notice of References Cited (PTO-892)  | 5. <input type="checkbox"/> Notice of Informal Patent Application (PTO-152)            |
| 2. <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948)   | 6. <input type="checkbox"/> Interview Summary (PTO-413),<br>Paper No./Mail Date _____. |
| 3. <input checked="" type="checkbox"/> Information Disclosure Statements (PTO-1449 or PTO/SB/08),<br>Paper No./Mail Date <u>01-28-05</u> | 7. <input checked="" type="checkbox"/> Examiner's Amendment/Comment                    |
| 4. <input type="checkbox"/> Examiner's Comment Regarding Requirement for Deposit<br>of Biological Material                               | 8. <input checked="" type="checkbox"/> Examiner's Statement of Reasons for Allowance   |
|  | 9. <input type="checkbox"/> Other _____.   |

### **EXAMINER'S AMENDMENT**

1. An examiner's amendment to the record appears below. Should the changes and/or additions be unacceptable to applicant, an amendment may be filed as provided by 37 CFR 1.312. To ensure consideration of such an amendment, it MUST be submitted no later than the payment of the issue fee.

Authorization for this examiner's amendment was given in a telephone interview with Gary R. Edwards on 16 February 2005.

2. The following changes to the drawings have been approved by the examiner and agreed upon by applicant: a clean version of the figures without markings is required. In order to avoid abandonment of the application, applicant must make these above agreed upon drawing changes.

### ***Allowable Subject Matter***

3. Claims 1-17 are allowed.

4. The following is an examiner's statement of reasons for allowance:

In view of the amendment to the claims and Applicants' arguments, the cited prior art fails to teach or strongly suggest Applicants' claimed invention. A search of the prior art did not reveal references that comprehensively teach a pulse tube refrigerator arrangement comprising a regenerator tube that is finned and having a plurality of fins associated with the regenerator tube arranged along the tube to transfer heat from an atmosphere surrounding the tubes to the regenerator tube, as required by independent claim 1. Furthermore, there was no clear teaching in the prior art of a method of operating a pulse tube refrigerator having a finned regenerator tube and a refrigerator

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sock around the tubes containing a helium atmosphere such that heat from the helium atmosphere is transferred to the regenerator tube through the fins, as required by independent claim 16. While the prior art does indicate that it was known in the art to have a finned regenerator tube in a pulse tube refrigerator (see for example US 5295355, Zhou et al.), such fins are adapted to reject heat from the regenerator to the surrounding environment. The present invention, however, is drawn to the opposite purpose of transferring heat from the surrounding atmosphere to the regenerator tube, as clearly recited in the claims. Therefore, the claimed invention is considered to be distinguishable from the cited prior art and is allowable.

Any comments considered necessary by applicant must be submitted no later than the payment of the issue fee and, to avoid processing delays, should preferably accompany the issue fee. Such submissions should be clearly labeled "Comments on Statement of Reasons for Allowance."

### ***Response to Arguments***

5. Applicant's arguments, filed 28 January 2005, with respect to the objection to the oath or declaration have been fully considered and are persuasive. This objection has been withdrawn.

### ***Conclusion***

6. The prior art made of record and not relied upon is considered pertinent to applicant's disclosure.

US 1734136 (Kramer): discloses a heat exchanger with spiral fins.

US 2737270 (Frisch et al.): discloses a heat exchanger with star fins.

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US 4103408 (Joekel): discloses a heat exchanger with spiral fins.

US 4951739 (Cates et al.): discloses a corrugated heat exchanger.

US 5582246 (Dinh): discloses a heat exchanger with star fins.

US 5746269 (Torii et al.): discloses a regenerative heat exchanger.

US 5791149 (Dean): discloses a pulse tube refrigerator with fins.

US 6591609 B2 (Kamen et al.): discloses a regenerator for stirling engine.

US 6691520 B2 (Kamoshita et al.): discloses a PTR having fins.

JP 53-132449: discloses a heat exchanger with annular fins.

JP 61-159093 (Ito): discloses a heat exchanger with rectangular fins.

JP 2003-21412 (Berkowitz): discloses regenerator with protrusions.

GB 2382127 A (Daniels et al): discloses PTR for an MRI apparatus.

7. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Richard L. Leung whose telephone number is 571-272-4811. The examiner can normally be reached on Mon-Fri.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Denise L. Esquivel can be reached on 571-272-4808. The fax phone number for the organization where this application or proceeding is assigned is 703-872-9306.

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Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

Richard L. Leung  
Examiner  
Art Unit 3744

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DENISE L. ESQUIVEL  
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TECHNOLOGY CENTER 3700